Process for making polymers containing a norbornene repeating unit by addition polymerization using an organo (nickel or palladium) complex

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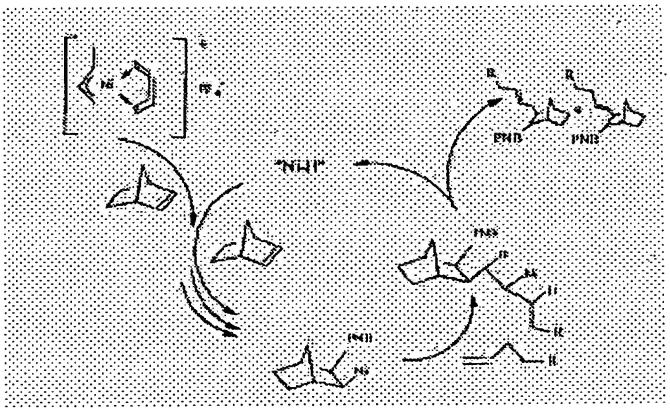

A single component ionic catalyst consists essentially of an organonickel complex cation, and a weakly coordinating neutral counteranion. The cation is a neutral bidentate ligand removably attached to a Group VIII transition metal in an organometal complex. The ligand is easily displaced by a norbornene-type (NB-type) monomer in an insertion reaction which results in an unexpectedly facile addition polymerization. A NB-type monomer includes NB or substituted NB, or a multi-ringed cycloolefin having more than three rings in which one or more of the rings has a structure derived from NB, and a ring may have an alicyclic alkyl, alkylene or alkylidene substituent. The insertion reaction results in the formation of a unique propagating species more soluble in a polar than in a non-polar solvent and devoid of an available beta -hydrogen for termination. The ensuing propagation of a polymer chain proceeds without measurable unsaturation. The chain continues to grow until the insertion of a monoolefinic chain transfer reagent results in substantially all chains being terminated with the residue of the chain transfer reagent. This unique chain transfer reaction allows one to control the molecular weight in a relatively narrow range. The reaction mixture for controlling the mol wt of the polymer chains may contain any other catalyst which generates a propagating species by an insertion reaction in an essentially anhydrous solvent. Both, mol wt and glass transition temperature Tg are tailored to provide a weight average mol wt Mw>20,000 but preferably not greater than about 500,000, and a Tg in the range from about 150 DEG C. to about 400 DEG C. or higher, if desired.